

CONTAINER HAVING A CUT PANEL LID WITH A PULL FEATURE

FIELD OF THE INVENTION

[0001] The present invention relates generally to containers with removable lids. More particularly the invention relates to containers with a panel cut from the container body to form an opening that is subsequently sealed by reattaching the panel with a pull feature, such that the panel functions as a removable lid.

BACKGROUND OF THE INVENTION

[0002] Many consumable goods are packaged in containers with removable lids to provide safe and convenient storage of the consumable goods. Such consumable goods include many items used by consumers, particularly food products. Frequently, the type of removable lid required for the consumable good may limit the design of the container. In addition, the production processes required to properly store the consumable goods may also limit the design of the removable lid.

[0003] Metal ends are commonly used to seal openings of containers. Metal ends of standard sizes can be economically produced, can be seamed to containers very quickly, and can be removed by consumers quickly and easily. However, as the closure design becomes more unique and complex the cost of the metal ends increase. Furthermore, product spillage can contaminate the sealing surfaces and diminish the quality of the seal of the metal end.

[0004] Heat-sealed flexible membranes are also used to seal container openings. However, it is often the case that a heat seal strong enough to survive harsh conditions, such as retort sterilization processes, makes the membrane difficult for consumers to remove. Plastic closures with screw-on tops can be applied to containers relatively quickly but are limited in size to smaller diameter openings. Plastic to plastic seals (such as spin welding or heat staking) may also be used to sufficiently seal a container, but the sealed closure cannot be easily separated to open the container. Additional closures such as foil membranes, paper ends, or plastic ends are applied to containers at relatively slower speeds compared to metal ends or plastic screw-on tops, which reduces the efficiency of those packaging processes.

[0005] Therefore, a need exists for a container with a removable lid that withstands harsh manufacturing processes, provides sufficient sealing abilities, and affords convenient removal by the consumer. In addition, the manufacturing process for such a container and removable lid should be cost-effective, timely, and consistent.

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BRIEF SUMMARY OF THE INVENTION

[0006] The invention addresses the above needs and achieves other advantages by providing a container comprising a container body formed by a wall with an opening defined in the wall. The opening in one embodiment is formed by cutting the wall to remove a panel from the wall. The panel is sized to substantially completely cover the opening. The panel is reattached to the container body to cover the opening and to create a sealed, frangible interface between the panel and the wall defining the opening. A pull feature is joined to the panel and, when pulled, causes detachment of the panel from the container body along the sealed, frangible interface. Removal of the panel provides access to the contents of the container through the opening.

[0007] The opening of the container may be in an end wall and the container may include a second opening on an end of the container opposite the end wall. A metal end may close the second opening. Alternatively, a foil membrane or a closure of the same material as the container may close the second opening. The pull feature joined to the panel may comprise a pull tab joined to the exterior surface of the panel or may comprise a pull tab connected to a ring or strip. If a pull tab is included, the panel may be reattached by heat staking. Alternatively, if a pull tab and ring are included, the pull tab may join the exterior surface of the panel and the ring may comprise a portion of the sealed, frangible interface. The ring may overhang the outer edge of the panel and engage the wall of the container proximate the opening to form the sealed, frangible interface. The ring may alternatively join the outer edge of the panel and engage the inner edge of the wall defining the opening to form the sealed, frangible interface. Adhesives may be used to facilitate the various sealed, frangible interfaces. Furthermore, a container may include any combination of closure for the second opening and pull feature for the panel.

[0008] Another embodiment of the present invention includes a container comprising a container body formed by a wall with an opening defined in the wall and a panel attached with a sealed, frangible interface between the panel and the wall defining the opening. The panel substantially completely covers the opening. A pull feature is joined to the panel and, when pulled, causes detachment of the panel from the container body along the sealed, frangible interface. Removal of the panel provides access to the contents of the container through the opening.

5 [0009] A further embodiment of the present invention includes a container comprising a thermoformed container body defining a top end of the container and a bottom end of the container. The top end includes an opening and the container body flares outwardly from the top end to the bottom end. A removable lid is attached to the top end of the container body to cover the opening.

10 [0010] A method for manufacturing a container is also provided. A wall defining the container body is formed and a panel is cut from the wall to define an opening. The panel is sized to substantially completely cover the opening. A pull feature is joined to the panel and the panel is reattached to the container body to cover the opening and create a sealed, frangible interface. The pull feature allows the panel to be detached from the container body along the sealed, frangible interface when the pull feature is pulled. The container body may be formed to include a second opening that may have various

15 closures attached to the second opening. In addition, the pull feature may include alternative portions that allow for various sealed, frangible interfaces.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

20 [0011] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

FIG. 1 is a perspective view of a container in accordance with a first embodiment of the invention;

30 **FIG. 2** is a perspective view of a container body as initially formed for making the container of FIG. 1;

FIG. 3 illustrates the container body having been cut to remove a panel from an end wall of the container body;

FIG. 4 shows a pull tab and ring having been affixed to the panel;

FIG. 5 shows the panel having been reattached to the container to close the opening;

FIG. 6 is a perspective view of the container illustrating the removal of the panel by a consumer;

FIG. 7 is a schematic, cross-sectional view of the container of FIG. 1, illustrating the ring of the pull feature located above the cut line, with a foil membrane enclosing the second opening, and with a product contained within the container body;

FIG. 8 is a schematic, cross-sectional view of a container, in accordance with a second embodiment of the invention, illustrating a container with a ring of the pull feature located within the cut line and with a double-seamed metal end enclosing the second opening;

FIG. 9 is a schematic, cross-sectional view of an embodiment of a container in accordance with a third embodiment of the invention, illustrating a container without a ring of the pull feature and with a heat staked polymer closure enclosing the second opening; and

FIG. 10 is a perspective view of the container of FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

[0012] The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which some, but not all embodiments of the invention are shown. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0013] With reference to FIGS. 1 – 6, a container and process for making the container in accordance with various embodiments of the present invention are illustrated. The container comprises a container body 10 having a side wall 20 of generally tubular or conical form, at least one end 27 of which defines an opening 36 closed by a removable

lid comprising a panel 12 to which a pull feature is attached, as further described below. In the first embodiment shown in **FIG. 1**, the container body 10 also has a membrane 40 that is attached to an opposite end 28 of a side wall 20 and is not intended to be removed; as an alternative to the membrane closure 40, this closure could instead be a metal end or a plastic end. The finished container of **FIG. 1** provides a sealed storage container for a product that is accessible by removing the panel 12. The pull feature of panel 12 illustrated in **FIG. 1** comprises a pull tab 30 and a ring 32 to facilitate the removal of the panel from the container body 10.

5 [0014] The container is made by first forming the container body 10 as shown in **FIG. 10**.

The container of **FIG. 2** initially has an end wall 22 at the end 27 of the side wall 20. The end wall 22 is generally perpendicular to the axis about which the side wall 20 extends. The side wall 20 extends from the end 27 and terminates at an opposite end 28. The opposite end 28 of the container body 10 of **FIG. 2** is open and defines a second opening 38.

15 [0015] The container body 10 is formed as a single integral piece, such as by injection molding, blow molding, or thermoforming a suitable polymer material. Alternative container bodies may include various materials, but are preferably plastic materials, and may be formed by various processes, such as thermoforming and blow molding to list two non-limiting examples.

20 [0016] The end wall 22 of the embodiment shown in **FIG. 2** is a generally planar panel of constant thickness that includes a peripheral portion 26. End walls of alternative container bodies may be of any shape or any size relative to the side wall 20; as an example, the end wall can be shaped to be non-planar so as to allow for distortion or expansion at high temperatures. The end 27 of side wall 20 joins the peripheral portion 26 of the end wall 22, and the side wall extends away from the end wall until terminating at the opposite end 28. The side wall 20 of **FIG. 2** includes an outward frustoconical flare from the end wall 22 to the opposite end 28 and includes an opposite end with a cross sectional thickness greater than the end 27 of the side wall. The additional thickness provides structural support for the container because the opposite end 28 preferably functions as the bottom of the finished container body 10. Alternative container bodies may be of any shape or size and the side wall 22 may extend away from

the end wall 20 at any angle relative to the end wall and the angle may also change as the side wall extends further from the end wall. The thickness of side wall 22 may be constant from the end 27 to the opposite end 28 or may change along any portion of the side wall 22.

5 [0017] Once the container body 10 has been made, the wall of the container body is cut to remove a panel 12 and to define an opening 36 in the container body. The cutting may be accomplished in various ways, including but not limited to cutting with a knife, a laser, an ultrasonic device, or the like. The panel 12 of FIG. 3 is cut out along a cut line spaced radially inward from the outer periphery of the end wall 22 such that a peripheral portion 26 remains joined to the side wall 20, and projects radially inwardly therefrom.
10 Alternative container bodies may remove the panel 12 from any portion of the container body, such as the side wall 20, to list a non-limiting example, or may remove the entire end wall such that no peripheral portion 26 remains joined to the side wall 20. The resulting panel 12 defines an outer edge 14 of the panel. The opening 36 defines an inner edge 24 of the end wall 22 that encircles the opening.
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20 [0018] As seen in FIG. 7, the cut line is made at a 45 degree angle and tapers inward as it progresses toward the interior of the end wall 22 such that the panel 12 may be removed from the exterior of the container body 10. Alternatively, the cut angle may range between 0 and 90 degrees if the panel 12 is to be removed from the exterior of the container body 10 or may range between 90 and 180 degrees if the panel is to be removed toward the interior of the container body. A 90 degree cut allows the panel 12 to be removed toward either the exterior or interior. Any cutting or perforating method may be utilized to separate the panel 12 from the wall of the container body 10. Preferably little or no material is removed from the container body 10 and panel 12 during the cutting process so that the panel 12 substantially completely covers or fills the opening 36, such that the outer edge 14 of the panel is closely adjacent the inner edge 24 of the container body 10.
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30 [0019] A pull feature, such as the combined pull tab 30 and ring 32 of FIG. 4, may be added to the panel 12. The pull feature facilitates removal of the panel 12 from the container body 10 after the panel has been reattached to the container body 10. The pull feature provides a surface that can be gripped to pull the panel 12 away from the

container body 10. Alternatively the pull feature may comprise only a pull tab 30 or may comprise a protrusion on the exterior surface 18 of the panel 12 formed when the container body 10 was formed. The protrusion may provide a convenient surface for an individual to pull the panel 12 from the container body 10. If the pull feature is joined to the panel 12 during a process subsequent to the forming of the container body 10, the joining process may include conductive heat sealing, ultrasonic sealing, heat staking, the applying of adhesives, or any other joining method.

[0020] The pull feature of **FIG. 4** is a single component consisting of a pull tab 30 and a ring 32, wherein the pull tab is connected to the ring and the ring is joined to the exterior surface 18 of the panel 12. The ring 32 of **FIG. 4** is joined along the perimeter of the panel 12 and overhangs the outer edge 14 of the panel 12. This configuration provides an overhanging portion of the ring 32 that may subsequently be used to form a sealed, frangible interface with a portion of the container body 10. The ring 32 may alternatively be joined to the outer edge 14 of the panel 12, or may be joined to any surface of the panel. Furthermore, the ring may completely encircle the panel 12, or the ring may only partially encircle the panel, such as with a 90 degree arc or a 180 degree arc, to list two non-limiting examples.

[0021] The pull feature of **FIG. 4** is joined to the panel 12 after the panel has been cut from the container body 10 and before the panel is reattached to the container body. Alternatively, the panels may include a pull feature joined before or during the cutting of the panel or joined during or after the reattaching of the panel. The pull feature may be of any suitable material such as a polymer, elastomer, or elastomeric polymer, to list non-limiting examples. The pull feature preferably can withstand harsh manufacturing processes while maintaining the structural strength to facilitate subsequent removal of the panel 12 from the container body 10.

[0022] **FIG. 5** shows the panel 12 reattached to the container body 10, and **FIG. 6** shows the panel being removed from the container body. The panel 12 of **FIG. 5** is reattached with a sealed, frangible interface 34, as illustrated in **FIG. 7**, created by the engagement of the overhanging portion of the ring 32 and the peripheral portion 26 of the container body 10. The sealed, frangible interface 34 provides a hermetic seal that prevents the transmission of oxygen, moisture, contaminants, and other substances into or

out of the container. Furthermore, the sealed, frangible interface 34 provides a separation surface for the panel 12 from the container body 10 because the bond strength between the overhanging portion of the ring 32 and the peripheral portion 26 of the container body is not as strong as the bond strength between the ring and the panel. Therefore, pulling the pull tab 30 of the pull feature, as illustrated in **FIG. 6**, separates the panel 12 from the container body 10 along the sealed, frangible interface 34 rather than removing the pull feature from the panel. **FIG. 6** shows the panel 12 partially removed, and further pulling on the pull tab 30 may completely remove the panel from the container body 10. The panel 12 may bend an amount less than, equal to, or greater than the bending of the panel shown in **FIG. 6**, as the amount of bending depends upon the thickness and material of the panel and the bond strength of the sealed, frangible interface 34.

[0023] An alternative sealed, frangible interface 134 is shown in **FIG. 8**. The pull feature is joined to the panel such that the ring 132 is joined to the outer edge of the panel 12 with an interface 136 and the pull tab projects above the exterior surface 18 of the panel. The interface 136 does not create a seal similar to the seal, frangible interface 134, but is not frangible during the ordinary use of the container. The sealed, frangible interface 134 of **FIG. 8** is created between the surface of the ring 132 opposite the outer edge 14 of the panel 12 and the inner edge 24 of the peripheral portion 26 of the container body 10'. Such engagement between the surface of the ring 132 and the inner edge 24 may include the addition of a bonding material or may involve a manufacturing process to create the sealed, frangible interface 134.

[0024] The sealed, frangible interface, such as the interface 34 of **FIG. 7**, the interface 134 of **FIG. 8**, or the interfaces of other embodiments, may include an adhesive or other joining compositions. Non-limiting examples of materials that may be applied to create the sealed, frangible interface are epoxies and heat set adhesives. Alternatively, the sealed, frangible interface may be created by a manufacturing process without the application of additional materials. One non-limiting example is a heat staking process using conductive, inductive, or ultra sonic methods. Regardless of the method used to create the sealed, frangible interface, the bond strength of the sealed, frangible interface is less than the bond strength between the joined pull feature and panel. The sealed, frangible interface is preferably configured such that once the panel 12 has been

removed, the inner edge 24 of the peripheral portion 26 does not include any surface defects that might interfere with removal of the contents or that might inconvenience the consumer.

[0025] FIG. 9 shows a panel 12 reattached to the container body 10" by heat staking to form a sealed, frangible interface 334. The pull feature of FIG. 9 does not include a ring, such as a ring 32 of FIG. 7; therefore, the panel 12 is reattached directly to the peripheral portion 26 of the container body 10. As shown in FIG. 9, the heat staking process essentially melts the material proximate the outer edge 14 of the panel 12 and the inner edge 24 of the peripheral portion 26 of the container body 10" so that the panel is reattached to the container body. A non-limiting example of a heat staking process is the use of RF generation wherein the electrodes are positioned adjacent the outer edge 14 and inner edge 24 to create a radio frequency field, preferably in the range of 0.1 to 300MHz, that melts the material comprising the outer edge and inner edge, which is preferably a heatable polymer or thermoplastic, thus creating the sealed, frangible interface 334; as known in the art, the RF process requires some type of electrically conductive material in the polymer. Alternative processes and materials may be used to create the sealed, frangible interface 334. Thus the sealed, frangible interface 334 of FIG. 9 reattaches the panel 12 and container body 10" along the cut line preferably with a bond strength less than the internal bond strength of the end wall 22 prior to cutting or with a configuration to facilitate subsequent removal of the panel from the container body along the sealed, frangible interface 334. A non-limiting example of a configuration to facilitate removal of the panel 12 is an interface that creates a stress concentration and to initiate and propagate the separation of the panel from the container body 10. Regardless of the method of reattaching utilized or the configuration of the panel, pull feature, and sealed, frangible interface, the panel 12 is reattached to the container body 10" to seal the container and to provide a convenient method of opening the container.

[0026] The panel 12 may alternatively be made separately from the container body 10, such that the opening 36 of the container of FIG. 4 was created during the forming of the container body. The container body 10 is formed with an opening 36 defining the inner edge 24 of the end wall and the panel 12 is sized to substantially completely cover the opening to create a sealed, frangible interface between the panel and container body when

the panel is attached to the container body. The separately made panel 12 may include a pull feature and/or may be attached by methods similar to those of the containers that include a panel cut from the container body 10.

[0027] The container body 10 may also include a second opening 38, as shown in FIGS. 2 – 5, defined by an opposite end 28 of the side wall 20. This second opening 38 is preferably included to allow the insertion of the contained product into the container body. FIG. 7 illustrates a product 50 contained within the container body 10 that is enclosed by a closure 40 attached to the opposite end 28 of the side wall 20. The contained product 50 is preferably inserted into the container body 10 after the panel 12 has been cut and reattached, or simply attached, and the sealed, frangible interface 34 has been created. After the contained product 50 has been inserted into the container body 10, a closure 40 is attached to the opposite end 28 of the side wall 20. The closure 40 is not intended to be removed by a consumer; rather, the panel 12 with the pull feature is intended to be removed by a consumer to gain access to the contents through the opening 36. Alternatively, other container bodies may not include a second opening 38 and closure, wherein the product 50 is inserted into the container body 10 prior to the reattachment of the panel 12, or the container bodies may not insert the product through the second opening 38 though one is provided.

[0028] Many containers manufactured with thermoforming, blow molding, or similar forming processes necessarily include an opening because of the mechanical limitations of the manufacturing process. The second opening 38 defined by the opposite end 28 of the side wall 20 of the FIG. 7 is an example of an opening created during forming. Often the opening created during forming is not the preferred opening for the consumer to gain access to the contents within the container. The present invention addresses this situation by cutting the panel 12 from the container and reattaching the panel to create an opening 36 for consumers to gain access to the product 50 while sealing the originally formed second opening 38 and preventing access to the product through the second opening. Alternatively, the container may be formed with multiple second openings or may be formed with no second opening. If a second opening is included in the container body, a closure may be attached to seal the product within the container.

[0029] Containers formed by thermoforming include an opening at the largest end of the container so that the container body can be removed from the thermoforming equipment. Because thermoforming equipment typically includes a single mold into which the raw material is formed, the formed item must not include any portions within the mold that are larger than the opening of the mold. Therefore, thermoformed items typically include an opening at the largest portion of the item. The present invention overcomes this constraint by providing a thermoformed container body **10** that defines a top of the container and a bottom end of the container. An opening **36** illustrated in **FIG. 4** is provided in the top end of the container body **10**, which coincides with the end wall **22**. The container body **10** flares outwardly from the top end to the bottom end. The opposite end **28** of side wall **20** functions as the bottom end of the container body **10**. By cutting the panel **12**, an opening **36** is provided on the top of the thermoformed container body. The panel **12** functions as a removable lid after it is reattached to the container body **10** to create the sealed, frangible interface. The opening formed while thermoforming the container body **10** is the second opening **38** that is subsequently covered by a closure.

[0030] The container body **10** of **FIG. 7** includes a closure that is a film membrane **40**. Preferably the film membrane **40** is a foil membrane with an upper polymer layer **44** and a lower foil layer **42** that provides convenient attachment to the opposite end **28** of the side wall **20** and that prevents the transmission of oxygen, moisture, and other substances through the membrane. After the product **50** has been inserted into the container body **10**, the membrane **40** is positioned over the second opening **38**, thus engaging the entire opposite end **28**, and is attached to the opposite end using adhesive materials or manufacturing processes to create a seal. The foil membrane **40** of **FIG. 7** is attached by conductively heating the upper polymer layer **44** along the opposite end **28** of the polymer container body **10** such that a bond is created. The foil membrane **40** thus defines the bottom of the container body **10** of **FIG. 7** and the panel **12** defines the top of the container.

[0031] An alternative closure for the second opening **38** of container body **10'** is shown in **FIG. 8**. The closure of **FIG. 8** is a metal end **240** double seamed to the opposite end **228**. The opposite end **228** includes a flange **230** that encircles the opposite end and that

projects outward from the opposite end. The flange 230 of **FIG. 8** facilitates the attaching of the metal end 240 by a double seam process. U.S. Patent No. 5,971,259 to Bacon discloses a method of double seaming metal ends to containers, the disclosure of which is incorporated herein. The metal end 240 is positioned over the second opening 38 thus engaging the entire opposite end 28 and is rolled and tucked about the flange 230 to attach the metal end and to create a seal that prevents the transmission of oxygen, moisture, and other substances through the interface between the metal end and flange 230. Compound materials may be included on the flange 230 or the portion of the metal end 240 engaging the flange to assist in the sealing of the metal end by filling any gaps created during the double seaming process.

[0032] Yet another alternative closure for the second opening 38 of container body 10'' is shown in **FIG. 9**. The closure of **FIG. 9** is a cover 440 of the same material as the container body 10''. Therefore, if the container body 10'' is a polymer material, to name a non-limiting example, then the cover 440 is the same polymer material. Providing the same material cover allows the cover to be attached to the opposite end 428 by a heat staking process to create a sealed interface 446. The heat staking process may be the same or similar heat staking process used to create the sealed, frangible interface 334 of **FIG. 9**. The material of the upper surface 444 of the cover is heated along with the material of the opposite end 428 such that the materials unite and when cooled create the sealed interface 446. Similar to the closures of **FIG. 7** and **FIG. 8**, the cover 440 of **FIG. 9** defines the bottom surface of the container body 10''. Alternative closures for second openings may be used for additional containers of the present invention. In addition, the various pull features and reattachment configurations for the panel 12 may be combined with the various closures and attachment configurations for the closures to define additional embodiments of the present invention.

[0033] A further embodiment of the container is illustrated in **FIG. 10**, wherein the pull feature is a pull tab 30 without a ring, such as the ring 32 shown in **FIG. 4**. The pull tab 30 of **FIG. 10** is attached to the exterior surface 18 of the panel 12. The pull tab 30 may be joined to the panel 12 before cutting the panel, before reattaching the panel, or after reattaching the panel. The pull tab 30 of **FIG. 10** may also be joined to the panel 12 by any of the processes used to attach the pull feature of FIGS. 1-6.

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[0034] Many modifications and other embodiments of the invention set forth herein will come to mind to one skilled in the art to which the invention pertains having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the appended claims. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.